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Motives for Security and Sexual Activity Among Single Individuals at the Onset of the  
COVID-19 Pandemic

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### Abstract

Amidst a global pandemic, survival needs become salient and the ability of individuals to regulate feelings and actions might be particularly relevant to protecting themselves from harm. Drawing from Regulatory Focus Theory (Higgins, 1998) individuals who are more focused on prevention are also more likely to enact health-protective behaviors, including sexual health behaviors, because they are more aware of threats. Extending this reasoning to the COVID-19 pandemic, we conducted a pre-registered longitudinal study with 174 individuals from 23 countries ( $M_{\text{age}} = 30.66$ ,  $SD = 11.81$ ; 77.6% women), to examine the role of regulatory focus in predicting the sexual activity of single individuals. We assessed demographic information, regulatory focus, and personality traits at baseline (T1), perceived threats two weeks later (T2), and sexual activity indicators two weeks later (T3). As hypothesized, results showed that single individuals who reported a greater focus on prevention (controlling for promotion) at the onset of the pandemic perceived more pandemic-related threats two weeks later and, in turn, reported less frequent sexual activity. These effects were consistent even when controlling for promotion (i.e., pleasure motives), personality, geographic location, local social distancing policies, gender, and sexual orientation. Findings are discussed considering their implications for the sexual functioning and sexual health of single individuals.

**Keywords:** COVID-19; Regulatory focus; Sexual activity; Sexual risk; Perceived threat; Singles

## **Motives for Security and Sexual Activity Among Single Individuals at the Onset of the COVID-19 Pandemic**

Since the coronavirus disease (COVID-19) was declared a global pandemic on March 11<sup>th</sup>, 2020, governments and local authorities have implemented guidelines for social distancing, quarantine, and isolation aimed at controlling the rapid spread of infections (e.g., Courtemanche et al., 2020). Faced with these disruptions, some people experienced negative reactions (e.g., increased levels of depression, anxiety, and loneliness; Bu et al., 2020; Robinson et al., 2022) that could have had consequences on their sexual functioning, activity, satisfaction, and desire (for reviews, see Delcea et al., 2021; Masoudi et al., 2022).

Past research has already shown that the ability to self-regulate feelings and actions—that is, to have control over oneself—predicts health and sexual behaviors (de Wit et al., 2018; Moilanen, 2015; Vohs & Baumeister, 2011). For example, individuals with higher self-regulation were less likely to enact health-threatening behaviors later on, including unprotected sex (Quinn & Fromme, 2010). Regulatory Focus Theory (Higgins, 1998, 2015) proposes that self-regulation operates differently when serving different needs and goals. Individuals more focused on prevention are motivated by security and obligations, seek to avoid the negative outcomes of risky situations even at the cost of missed opportunities, and experience negative affect from the anticipation of such outcomes (Higgins et al., 2001; Idson et al., 2000). These individuals are more likely to engage in protective behaviors because they are more aware of potential threats and believe they have greater control over their behaviors (Lemarié et al., 2019; Rodrigues et al., 2019). In contrast, individuals more focused on promotion are motivated by pleasure, seek to obtain gains even at the cost of negative outcomes, and experience positive affect by the anticipation of such outcomes (Higgins et al., 2001; Idson et al., 2000). These individuals are more likely to make riskier decisions and believe they have control over the outcomes (Guo & Spina, 2015; Langens, 2007).

In times of heightened health risk—much like the COVID-19 pandemic—survival needs (i.e., security and nurturance) can become more salient, and being able to self-regulate behaviors according to security motives may determine health-protective actions. During the lockdown, meeting partners to have sex represented a source of risk that some individuals may have been more (or less) willing to take. For example, some individuals ignored social distancing policies and risked exposure during periods of quarantine to have casual sex (e.g., Ballester-Arnal et al., 2021; Hammoud et al., 2020; Shilo & Mor, 2020). On the other hand, individuals who were single and more focused on prevention (vs. promotion) had weaker intentions to have casual sex (Rodrigues, 2021b), but there is no evidence of whether these intentions translated into actual sexual activity. Hence, we sought to extend past findings and test the role of regulatory focus in predicting the sexual activity of single individuals at the onset of the pandemic. That is, we examined if individuals more focused on prevention (i.e., security motives) perceived more pandemic-related threats two weeks later and in turn enacted less sexual activity the following two weeks.

### **Relationships During the Pandemic**

The pandemic had an impact on relationship functioning (Pietromonaco & Overall, 2021). For example, experiencing more pandemic-related stressors (e.g., perceived threat, financial strain, loneliness, and stress) predicted more conflicts and poorer relationship quality later on (Balzarini, Muise, Zoppolat, et al., 2022; Zoppolat et al., 2022). The effects of the pandemic on sexual behavior and sexual desire have been more complex. Even though most individuals experienced decreases in sexual frequency, had sex with fewer partners, and enacted more risky sexual behaviors (e.g., condomless sex), some individuals have also experienced positive outcomes (e.g., Balzarini et al., 2021; Balzarini, Muise, Gesselman, et al., 2022; Dacosta et al., 2021; Hammoud et al., 2020; Lehmillier et al., 2021; Li et al., 2020; Rodrigues, 2021a; Shilo & Mor, 2020; Wignall et al., 2021). We argue that being exposed to

external stressors may help explain this overall negative pattern. For example, individuals who experienced more conflicts with their partners during the pandemic also reported less frequent intimate (e.g., hugging, kissing) and sexual behaviors (e.g., oral sex, intercourse; Luetke et al., 2020). Other studies highlighted the importance of knowledge and risk perception to sexual functioning. For example, individuals who were more knowledgeable about COVID-19 (e.g., knew more about the ways of transmission), and those who enacted more protective behaviors (e.g., adhered to social distancing), reported a decrease in intercourse and oral sex frequency with their partners during the pandemic (Hensel et al., 2020). Moreover, individuals who perceived more pandemic-related risks were more likely to report negative changes in their sexual activity (Ko et al., 2020).

Although these studies provide interesting insight into sexual behaviors during the pandemic, it is important to disentangle the sexual behaviors of individuals according to their relationship status. Some studies have done so. For example, Hille and colleagues (2021) found that single individuals engaged in partnered sexual activities (e.g., oral sex and intercourse) less frequently than individuals in a romantic relationship. Instead, single individuals tended to increase their engagement in solo sexual activities (e.g., masturbatory behaviors), mostly because they wanted to protect themselves and others from contracting or spreading COVID-19, and because there was no partner(s) readily available to have sex with. This decrease in partnered sexual activity was particularly evident among individuals who were single and living alone (vs. with a romantic partner; Griffin et al., 2022). Furthermore, recent research has found that single individuals were more likely to have had sex during confinement with someone they already knew and less likely to do so with a new acquaintance (Herbenick et al., 2022). Given that single individuals tended to perceive sexual activity with anyone (and not only with less known casual partners) as a risky sexual practice

(Bowling et al., 2021), we argue that risk perception and security enactment might have determined single individuals' sexual behaviors and risk-taking during the pandemic.

### **The Role of Regulatory Focus in Shaping Health Behaviors**

Regulatory focus can be conceptualized as a trait-like orientation that motivates individuals to pursue goals in different domains but also as a state-like orientation elicited by specific situational stimuli (Higgins, 1998), and the risk-regulating effects of having a prevention focus on health behaviors tend to endure over time. For example, individuals more focused on prevention were more likely to maintain smoking cessation after attending an intervention and reported fewer relapses in smoking behavior 15 months later (Fuglestad et al., 2013). By being more focused on prevention, individuals take fewer risks with their health and safety (Zou & Scholer, 2016) and are more likely to engage in different health-protective behaviors, such as wearing a helmet (Aryee & Hsiung, 2016), adhering to medical care prescription/advice (Avraham et al., 2016), adhering a vaccine (Leder et al., 2015), engaging in screening(s) for cancer (Ferrer et al., 2017), or using condoms with casual partners (Rodrigues et al., 2020; Rodrigues, Lopes, & Carvalho, 2022).

Research at the onset of the pandemic has already examined the role of regulatory focus in modulating risk perception, health behaviors, and overall functioning. For example, individuals more focused on prevention were also more motivated to retrieve COVID-19 knowledge from more objective sources of information (e.g., official health reports; Rodrigues, 2021b). Being more focused on prevention predicted more negative affective experiences if individuals felt less supported by their close social network (Rodrigues, Zoppolat, et al., 2022) but at the same time more risk awareness and more preventive behaviors enactment (e.g., washing hands more frequently; Rodrigues, Lopes, & Balzarini, 2022).

To the best of our knowledge, studies have yet to examine *if* and *why* regulatory focus informed the sexual behaviors of single individuals at the onset of the pandemic. Single individuals are potentially exposed to different infections when they pursue sexual activity and perceived casual sex as a particularly risky practice during the pandemic (Bowling et al., 2021). As such, having a predominant focus on prevention might have negatively impacted their sexual behavior with casual partners (Rodrigues, 2021b) and this might have occurred due to perceptions of pandemic-related risks and threats (e.g., Lehmler et al., 2021; Li et al., 2020). Aligned with this reasoning, past research has shown that individuals concerned with external threats (e.g., STI transmission) are likely to inhibit their sexual responses, have lower sexual desire, are less inclined to seek out sexual stimuli, have less positive attitudes toward casual sex, are less prone to sexual risks, and have greater germ aversion (Bancroft et al., 2009; Duncan et al., 2009; Murray et al., 2013; Velten, 2017). A similar effect was observed when a COVID-19 threat was experimentally made more salient to participants (Moran et al., 2021). As motives, attitudes, and actions towards sexual behaviors determine personal health, examining regulatory focus might be crucial to understanding the implications of enacting (or not) sexual behaviors during health-threatening times.

### **Overview of the Current Research**

Past research has examined the effects of regulatory focus on health generally (e.g., Avraham et al., 2016; Leder et al., 2015; Rodrigues, Lopes, & Balzarini, 2022) and sexual health in particular (Rodrigues, 2021b; Rodrigues et al., 2019, 2020). As sexual activity with casual partners presented extra health risks during the first months of the COVID-19 pandemic (Bowling et al., 2021), we expected regulatory focus to determine the sexual activity of single individuals. Specifically, single individuals more focused on prevention (controlling for promotion) at baseline (T1) should engage in intercourse and oral sex less frequently and have sex with fewer partners four weeks later (at T3; Hypothesis 1).



We further sought to test whether the perception of pandemic-related threats was one of the mechanisms explaining the impact of regulatory focus on sexual activity. In the face of pandemic-related stressors, individuals more focused on prevention perceived more risks and were more worried about becoming infected (Rodrigues, Lopes, & Balzarini, 2022). As such, individuals more focused on prevention at T1 should perceive more pandemic-related threats two weeks later (T2; Hypothesis 2). As threat perceptions have been associated with risk-taking, sexual functioning, and sexual behaviors (Bancroft et al., 2009; Duncan et al., 2009; Hensel et al., 2020; Ko et al., 2020; Murray et al., 2013; Velten, 2017), we also expected threat perceptions to explain the negative impact of a predominant prevention focus on sexual activity (Hypothesis 3). These hypotheses are depicted in Figure 1 and were pre-registered on the Open Science Framework ([OSF](#)).

-- Figure 1 about here --

Lastly, we ruled out the potential effects that *a priori* contextual differences (e.g., local policies and restrictions) and demographic differences (e.g., age, gender) might have had in shaping perceptions and behaviors during the first months of the pandemic.

## Method

### Participants and Procedure

Data were collected as a part of the Love in the Time of COVID project. This project was launched on March 27<sup>th</sup>, 2020, shortly after the global pandemic was declared (for a detailed description, see Balzarini, Muise, Zoppolat, et al., 2022). The survey was originally available in English and then translated to 10 other languages following the typical back-translation procedure (Colina et al., 2017). Prospective participants were recruited through the project's website (<https://loveinthetimeofcovid.me/>), social media sites (e.g., Facebook, Instagram, Reddit), and word of mouth, and had to be 18 years or older to participate. We invited individuals to participate in a global longitudinal study that examined how people

connected, related, and coped during the COVID-19 pandemic, and provided a link that redirected individuals to a survey hosted on Qualtrics. Participation was completely voluntary, and no compensation was offered. After providing informed consent, participants proceeded to the baseline assessment (T1). Upon completion, they were asked to provide their email addresses to take part in the follow-up surveys every two weeks throughout the pandemic. This was voluntary and participants were again guaranteed confidentiality and that their responses would be kept anonymous. The complete study's design, procedures, and materials can be consulted on the project's [OSF](#) page, and were approved by the Institutional Review Board at the University of Georgia (USA) before the project was launched (IRB ID: PROJECT00002117).

The current study uses data from the first three time points (T1-T3), measured two weeks apart (covering one month). To be included in analyses, participants had to be single (i.e., not in a committed relationship) throughout the three waves of data collection, with less than 10% missing data on the main measures under examination. The surveys included other measures that were not considered for this study. Also, participants were allowed to skip the questions related to sexual behavior without compromising their participation. The combination of these criteria yielded 183 single individuals with valid responses in all three waves of data collection. As commonly employed in the literature (e.g., Berinsky et al., 2014; Curran, 2016), we also included four attention check questions. At T1, two items asked participants to select a particular answer choice for that question (e.g., "Please select 'Agree a little.' This is not a trick question."). At T2 and T3, we asked participants "How much attention did you pay to this questionnaire while you were completing it?". Possible responses were on a 4-point scale (1 = *No attention*, 2 = *Very little attention*, 3 = *Moderate amount of attention*, 4 = *Very close attention*). Participants who did not correctly answer at least one of these attention checks at T1 ( $n = 1$ ), and those who indicated they paid very little

or no attention to the survey at T2 ( $n = 5$ ) and T3 ( $n = 3$ ) were not included in analyses. This resulted in a final sample size of 174 single individuals from 23 countries. Participants had a mean age of 30 years ( $M = 30.66$ ,  $SD = 11.81$ ) and were mostly female (77.6%), heterosexual (64.9%), and university graduates (31.5%) (see Table 1 for details).

-- Table 1 about here --

### Measures<sup>1</sup>

**Regulatory Focus.** Two items retrieved from the Regulatory Focus Questionnaire (Lockwood et al., 2002) were used to assess prevention (“In general, I am focused on preventing negative events in my life”) and promotion goals (“In general, I am focused on achieving positive outcomes in my life”) at baseline (T1). Given the longitudinal design of this study, we decided to use single-item measures to reduce fatigue and maximize participation over time (Bolger et al., 2003). Possible responses were on a 9-point scale (1 = *Not at all true of me*, 9 = *Very true of me*). Higher scores indicated a greater focus on prevention ( $M = 6.52$ ,  $SD = 1.85$ ) or promotion goals ( $M = 7.30$ ,  $SD = 1.61$ ). Both scores were positively correlated,  $r = .16$ ,  $p = .034$ , and treated separately in our analyses (see Lockwood et al., 2002).

**Perceived Threat.** We used two items at T2 to assess the extent to which individuals perceived the current COVID-19 situation as serious (e.g., “The current situation due to the COVID-19 virus is very serious”) and threatening to their lives (e.g., “The current situation due to the COVID-19 virus feels personally threatening: financially, emotionally, or physically”). Responses were given on a 5-point scale (1 = *Not at all*, 2 = *A little*, 3 = *A*

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<sup>1</sup> We developed a single item assessing the frequency of condom use at T3 (“In the past 2 weeks, when you have had sex [either penis in vagina or penis in anus/butt], what percentage of the time did you use a condom?”). Responses were given on a sliding scale from 0% to 100%, with higher scores indicating more frequent condom use. However, only 47 participants provided answers to this question, and therefore we dropped the item from our analyses.

*moderate amount*, 4 = *A lot*, 5 = *Completely*). Items were mean aggregated,  $r = .48$ ,  $p < .001$ , with higher scores indicating more perceived threat ( $M = 3.72$ ,  $SD = 0.85$ ).

**Sexual Activity.** We used two items at T3 to assess the frequency with which individuals engaged in intercourse (“During the past 2 weeks, how often did you engage in intercourse [in person]?”) and oral sex (“During the past 2 weeks, how often did you engage in giving or receiving oral sex [in person]?”). Responses were given on a 7-point rating scale (1 = *Not at all*, 2 = *Once or twice*, 3 = *Once a week*, 4 = *2-3 times a week*, 5 = *4-5 times a week*, 6 = *Once a day*, 7 = *More than once a day*). Items were assessed separately, with higher scores indicating greater frequency of intercourse ( $M = 1.36$ ,  $SD = 0.90$ ) or oral sex ( $M = 1.36$ ,  $SD = 0.91$ ). We used an additional single item at T3 to assess the number of sex partners, by asking participants “In the past 2 weeks, how many people have you engaged in sexual intercourse with? [please write in the number of people]”. Higher values indicated more sex partners ( $M = 0.28$ ,  $SD = 0.58$ ). Items were analyzed separately.

### **Data Analytic Plan**

We used the PROCESS 3.4 macro for SPSS (Hayes, 2018) to test our main hypotheses and computed three mediation models with 10,000 bootstrap samples (for a discussion, see Hayes, 2009). PROCESS allows the estimation of multiple predictor variables in a given analysis by entering additional predictors as covariates (see Hayes, 2018), to determine the unique effects of one predictor while controlling for the effect of other(s). Prevention scores were the predictor variable and promotion scores were the covariate (both at T1). Perceived threat at T2 was the mediator variable. Because answers to the sexual behavior items at T3 were optional, the sample size varied across models. Frequency of intercourse was the outcome measure in Model 1 ( $n = 174$ ), frequency of oral sex was the outcome variable in Model 2 ( $n = 173$ ), and the number of sexual partners was the outcome variable in Model 3 ( $n$

= 133). We conducted additional analyses controlling for local distancing policies as a potential confound to our findings.

Lastly, we explored gender differences (for sake of parsimony, we removed three participants from the “other” category for this analysis) using *t*-tests, and sexual orientation differences using ANOVAs with Bonferroni corrections. We also computed correlations with age. When differences or significant correlations were identified, we re-ran the models entering additional covariates.

## Results

### Motives and Sexual Behavior

Results of the mediation analyses are summarized in Table 2. Total and direct effects were non-significant in all models, all  $p \geq .600$  (Hypothesis 1). Nevertheless, we proceeded to test indirect effects given that significant total effects are not a necessary condition for mediation (for discussions, see Hayes, 2009; Rucker et al., 2011; Shrout & Bolger, 2002).

As hypothesized in our preregistration, participants more focused on prevention perceived more pandemic-related threats two weeks later, all  $p \leq .047^2$  (Hypothesis 2), which, in turn, predicted less frequent intercourse,  $p = .025$ , and oral sex,  $p = .029$ , and a lower number of sex partners,  $p = .034$ , in the two weeks that followed (Hypothesis 3). Indirect effects through perceived threat were significant for intercourse frequency and oral sex frequency, but not for the number of sex partners. Sensitivity power analyses using G\*Power (Faul et al., 2009) indicated that we had 95% power to detect small effect sizes  $.10 < f^2 < .13$ . These findings suggest that having a predominant focus on prevention has negatively impacted sexual behavior during the COVID-19 pandemic because individuals perceived more pandemic-related threats.

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<sup>2</sup> Significance values vary according to sample size in each model: in Model 1 ( $n = 174$ ),  $p = .028$ ; in Model 2 ( $n = 173$ ),  $p = .029$ ; in Model 3 ( $n = 133$ ),  $p = .047$ .

-- Table 2 about here --

Given our heterogeneous sample, we additionally explored the possibility that social distancing policies between countries and regions during the pandemic might have influenced individual perceptions and sexual behaviors. Overall, local social distancing policies at T3 were encouraged for 34.5% of our participants, ordered for 30.5%, and enforced for 29.3%, whereas 5.7% indicated no social distancing policies. Using this variable as a covariate in our models did not change the pattern of results (see Supplemental Materials S1 for details). In other words, the fact that individuals who were more focused on prevention were having less sex was explained by their threat perceptions and not by the likelihood of following social restrictions and local policies.

## **Exploratory Analyses**

### ***Demographic Differences***

We also explored if differences in age, gender, sexual orientation, or personality explained our findings. We found only gender differences in intercourse and oral sex frequency, both  $p \leq .037$ , and correlations with personality traits, all  $p \leq .009$  (see Supplemental Materials S2 for details). Examining gender or personality as covariates in our models showed that the indirect effects remained significant but were reduced after controlling for negative emotionality. These results suggest that the negative effects of prevention focus on sexual activity due to perceived threats were largely independent of *a priori* demographic differences in our sample.

## **Discussion**

The current study showed that being more focused on prevention at the onset of the COVID-19 pandemic was associated with more threat perceptions later on, which then were associated with less sexual activity among single individuals. These results could not be accounted for having a predominant focus on promotion (i.e., pleasure motives) or local

social distancing policies, and were consistent across gender. The finding that results became weaker after controlling for personality suggests that negative emotionality also played role in the perception of pandemic-related threats, much like having a predominant focus on prevention.

Research has shown that the experience of external stressors due to the pandemic has had a negative influence on sexual behavior (e.g., Cito et al., 2021; Ko et al., 2020; Lehmillier et al., 2021; Li et al., 2020; Wignall et al., 2021) and the pandemic has made access to partnered physical sex more difficult for single individuals (e.g., Hille et al., 2021). Congruently, we found an overall low frequency of sexual activity and a low number of sex partners in our data. However, not all individuals' sexual activity suffered during the pandemic and our work highlights that regulatory focus played an important role in predicting the frequency of sexual behaviors.

We showed, for the first time, that prevention focus indirectly shaped the sexual activity of single individuals, an effect driven, at least in part, by the perceptions of threats caused by the pandemic (Hypotheses 2 and 3). More specifically, individuals concerned about their health and focused on their security reported a heightened perception of pandemic-related threats and then indicated having intercourse and oral sex less frequently (the indirect effect on the number of sex partners was non-significant). Our findings converge with past studies showing that perceived threats to one's safety foster different health-protective behaviors. For example, studies framed by the Information-Motivation-Behavioral Skills Model (for a review, see Fisher et al., 2003) show that motivations to avoid risky behaviors (e.g., heightened by the perception of health risks) are associated—directly or indirectly—with health-protective behaviors, such as using medications as prescribed (Bian et al., 2015), intentions and use of PrEP medication (Walsh, 2019), or using condoms (Espada et al., 2016). Similarly, studies framed by the Health Belief Model (for a review, see

Skinner et al., 2015) show that perceived vulnerability to risk and its expected severity are associated—directly or indirectly—with health-protective behaviors, including, a lower likelihood of starting to smoke (Song et al., 2009), HPV vaccine uptake (Gerend & Shepherd, 2012), being more assertive with their partners regarding condom use (Wright et al., 2012), and condom use (Reid & Aiken, 2011). Our study suggests that similar mechanisms occurred throughout the COVID-19 pandemic, and extends this body of literature by highlighting that motivations for security, through perceived threat, can increase general health behaviors enactment (e.g., social distancing; Rodrigues, Lopes, & Balzarini, 2022) and decrease the likelihood of engaging in sexual activity.

Notably, our indirect effects occurred in the absence of a direct effect of prevention focus on sexual behavior (Hypothesis 1), suggesting that security motives were not directly detrimental to the sexual activity of single individuals. Instead, these motives shaped how single individuals perceived and reacted to the context, and consequently how they approached sex and pursued (or not) sexual activity. As such, threat perceptions seem to have protected individuals against taking health risks at the onset of the pandemic and resulted in worse sexual functioning (Hensel et al., 2020; Ko et al., 2020) and more negative affective experiences (Rodrigues, Zoppolat, et al., 2022). In times when physical proximity can be detrimental to one's own and others' health, engaging in casual sex may have been perceived by some individuals as a risk not worth taking (e.g., Bowling et al., 2021). For example, individuals are less willing to have casual sex when they perceive themselves to be more susceptible to infectious diseases (Duncan et al., 2009), when the threat of infection is more salient to them (Moran et al., 2021; Murray et al., 2013), and when they are more focused on prevention (Rodrigues et al., 2019). As individuals more focused on prevention feel less safe having sex with casual partners (Rodrigues et al., 2020) and are more attentive to health risks (Rodrigues et al., 2019), they might be less motivated to have sex in general—and not only



during the pandemic—as a strategy to preserve their health and avoid risky sexual behaviors. Thus, while the sexual life of single individuals seems to have been negatively impacted by the pandemic, regulatory focus may have been functional for safeguarding physical health.

### **Strengths, Limitations, and Future Directions**

This study had several strengths that give us confidence in the results reported here and allowed us to better understand how regulatory focus may have been influencing sexual behavior during the pandemic. Specifically, our study was pre-registered and had a prospective design spanning one month that allowed us to examine temporal effects predicted *a priori*. This work extended previous research examining individuals' reported intentions to engage in sexual activity (e.g., Rodrigues, 2021b) and examined actual behaviors, providing greater insight into sexual activity during the pandemic. Also, this study relied on a sample of participants from around the world, albeit primarily from western countries. Worth noting, our findings were consistent even after controlling for the social distancing policies in effect across different countries and regions. This means that our effects were not driven by greater adherence to local health policies, providing support for the generalizability of our current findings.

Despite these strengths, some limitations must also be acknowledged. Apart from the typical attrition observed in longitudinal designs, participants in this study were given the option to answer questions about their sexual lives, including their sexual behaviors and sexual health decisions (e.g., condom use). Some of our participants decided to skip these questions, which forced us to test our hypotheses with a smaller sample size than we anticipated in the pre-registration. However, we must also acknowledge that sample size estimations were highly conservative ( $f^2 = .025$ ) and that sensitivity analyses showed that we had enough power to detect small effect sizes in our data. Past research has suggested that women and educated individuals are more likely to participate in sex research (e.g., Fenton et

al., 2001; Senn & Desmarais, 2001), which may explain some bias and gender differences in our sample. Moreover, although some researchers have discussed the reliability and validity of single-item measures (e.g., Bergkvist & Rossiter, 2007; Jovanović & Lazić, 2020), we assessed our main variables using one or two item measures. All these issues raise questions regarding the representativeness of our sample and the generalizability of our findings that should be addressed in future studies. For example, researchers should seek to replicate our current findings with a larger sample, more extensive and validated measures, and additional sexual health measures to increase power and provide a broader understanding of regulatory focus. We were also unable to determine if individuals more focused on prevention tended to experience declines in sexual activity because of perceiving more threats or simply because they avoided all types of sexual activity, were more restrictive in safety negotiations with their partners (e.g., have sex only after getting tested for COVID-19), or enacted other forms of sex. For example, individuals motivated by security could have chosen to engage in sexual activities that did not require physical contact (e.g., sexting, video sex, online dating). By doing so, individuals could control the risks of infection and safeguard their health, while being able to pursue sexual, social, and affective needs. Likewise, we were unable to distinguish between individuals who were pursuing sex with partners outside their immediate social circle (i.e., strangers or less known partners), those who pursued sex with partners from within this circle (e.g., ex-partners; roommates; friends with benefits), or even if individuals were living with potential partners at some point while describing themselves as single (e.g., Griffin et al., 2022; Herbenick et al., 2022). Future research should seek to examine not only the type of partners and living status but also the diversity in sexual behaviors (Lehmiller et al., 2021), as individuals may have shifted the sexual activity they engaged in or the partners with whom they had sex when considering the health risks associated with in-person activities amidst the pandemic.

## Conclusion

The COVID-19 pandemic has caused myriad disruptions at social, interpersonal, and individual levels. Yet, the ability to regulate feelings and actions seems to have been vital for individuals to navigate these troubled times and protect their health. In the current longitudinal study with single individuals, we showed that security motives predicted individuals' perceptions of pandemic-related threats, resulting in decreased sexual activity. In health-threatening times, stressors negatively impact the way individuals are sexually relating to each other. Whereas some evidence suggests that favoring health security might be key to protecting oneself from harm (e.g., Avraham et al., 2016; Fuglestad et al., 2013; Leder et al., 2015; Rodrigues, Lopes, & Balzarini, 2022), our study suggests that it also might come at costs for sexual functioning.

## Data Availability Statement

The data and syntax for all analyses reported in this paper are available online ([OSF](#)).

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**Table 1***Demographic Characteristics*

	<i>N</i>	<i>M (SD) or %</i>
Age	172	30.66 (11.81)
Gender		
Male	36	20.7
Female	135	77.6
Other (e.g., non-binary)	3	1.7
Sexual orientation		
Heterosexual	113	64.9
Lesbian/gay	15	8.6
Bisexual	38	21.8
Other (e.g., asexual; queer, pansexual)	8	4.6
Education level		
Less than 6 years	1	0.6
Less than 12 years	0	0.0
High school graduate	16	9.2
Some university	32	18.4
Associates degree	8	4.6
University graduate	61	31.5
Master level degree	41	23.6
Doctoral degree	15	8.6
Survey Language		
English	78	44.8
Spanish	39	22.4
Turkish	8	4.6
Thai	5	2.9
Chinese	4	2.3
Dutch	5	2.9

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French	10	5.7
German	7	4.0
Indonesian	0	0.0
Italian	9	5.2
Portuguese	9	5.2
Country		
Austria	1	0.6
Azerbaijan	1	0.6
Belarus	1	0.6
Canada	7	4.0
China	4	2.3
Czech Republic	1	0.6
Denmark	1	0.6
France	5	2.9
Germany	3	1.7
Greece	1	0.6
Honduras	1	0.6
Italy	3	1.7
Luxembourg	1	0.6
Netherlands	10	5.7
Portugal	7	4.0
South Korea	1	0.6
Spain	39	22.4
Sweden	1	0.6
Switzerland	15	8.6
Thailand	5	2.9
Turkey	9	5.2
United Kingdom of Great Britain and Northern Ireland	1	0.6
United States of America	56	32.2

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## Security motives and sex activity during COVID-19

**Table 2**

*Mediations Analyses: Prevention Focus (T1), Perceived Threat (T2), and Sexual Activity (T3)*

	Intercourse frequency		Oral sex frequency		Number of sex partners	
	<i>b</i> ( <i>SE</i> )	95% CI	<i>b</i> ( <i>SE</i> )	95% CI	<i>b</i> ( <i>SE</i> )	95% CI
Perceived threat	-0.18* (.08)	[-0.345; -0.023]	-0.18* (.08)	[-0.344; -0.019]	-0.13* (.06)	[-0.247; -0.010]
Prevention focus						
Total effect	-0.02 (.04)	[-0.090; 0.058]	0.00 (.04)	[-0.070; 0.079]	-0.02 (.03)	[-0.072; 0.042]
Direct effect	-0.00 (.04)	[-0.076; 0.073]	0.02 (.04)	[-0.057; 0.094]	-0.00 (.03)	[-0.061; 0.053]
Indirect effect	-0.01 (.01)	[-0.037; -0.001]	-0.01 (.01)	[-0.038; -0.001]	-0.01 (.01)	[-0.038; 0.003]
Promotion focus (Cov.)	-0.01 (.04)	[-0.098; 0.072]	0.02 (.04)	[-0.068; 0.103]	0.02 (.03)	[-0.037; 0.082]

*Note.* Cov. = covariate. Key findings: Indirect effects show that prevention focus scores were associated with more pandemic-related threats two weeks later, which, in turn, were associated with less frequent intercourse and oral sex.

\* $p \leq .050$ .

## Security motives and sex activity during COVID-19

### Supplemental Materials

#### S1

#### *Mediations Analyses Controlling for Local Distancing Policies*

	Intercourse frequency		Oral sex frequency		Number of sex partners	
	<i>b</i> ( <i>SE</i> )	95% CI	<i>b</i> ( <i>SE</i> )	95% CI	<i>b</i> ( <i>SE</i> )	95% CI
Perceived threat (T2)	-0.17* (.08)	[-0.336; -0.010]	-0.17* (.08)	[-0.334; -0.004]	-0.13* (.06)	[-0.250; -0.010]
Prevention focus (T1)						
Total effect	-0.02 (.04)	[-0.090; 0.059]	0.00 (.04)	[-0.070; 0.080]	-0.02 (.03)	[-0.072; 0.042]
Direct effect	-0.00 (.04)	[-0.077; 0.072]	0.02 (.04)	[-0.057; 0.093]	-0.00 (.03)	[-0.062; 0.052]
Indirect effect	-0.01 (.01)	[-0.033; -0.001]	-0.01 (.01)	[-0.035; -0.001]	-0.01 (.01)	[-0.037; 0.002]
Promotion focus (T1) (Cov.)	-0.01 (.04)	[-0.095; 0.076]	0.02 (.04)	[-0.064; 0.108]	0.02 (.03)	[-0.038; 0.081]
Local distancing policies (T3) (Cov.)	0.07 (.08)	[-0.081; 0.216]	0.08 (.08)	[-0.072; 0.228]	-0.02 (.06)	[-0.125; 0.092]

*Note.* Cov. = covariate. \* $p \leq .050$ .

## S2

### *Demographic Differences – Summary of findings*

We found gender differences on intercourse frequency,  $t(168) = -2.49, p = .014, d = 0.38$ , and oral sex frequency,  $t(169) = -2.10, p = .037, d = 0.32$ , but not on prevention scores, promotion scores, or number of sex partners, all  $p \geq .098$ . Results showed that women reported more frequent intercourse ( $M = 1.44, SD = 1.00$ ) and oral sex ( $M = 1.45, SD = 1.01$ ) than men ( $M = 1.08, SD = 0.28$  and  $M = 1.03, SD = 0.17$ , respectively). We also found differences in prevention scores according to sexual orientation, such that heterosexual participants scored higher on prevention ( $M = 6.74, SD = 1.76$ ) compared to LGBTQI+ participants ( $M = 6.10, SD = 1.96$ ),  $t(172) = 2.22, p = .028, d = 0.35$ . No other significant differences according to sexual orientation, all  $p \geq .365$ , nor significant correlations with age emerged, all  $p \geq .266$ . Based on these findings, we only ruled out the potential confound of gender and sexual orientation in our findings. Controlling for gender, results showed that the indirect effects through perceived threats remained significant for intercourse frequency,  $b = -0.01, SE = .01, 95\% CI [-0.038; -0.001]$  and oral sex frequency,  $b = -0.01, SE = .01, 95\% CI [-0.039; -0.001]$ . Controlling for sexual orientation, results showed that the indirect effects through perceived threats remained significant for intercourse frequency,  $b = -0.01, SE = .01, 95\% CI [-0.035; -0.001]$  and oral sex frequency,  $b = -0.01, SE = .01, 95\% CI [-0.037; -0.001]$ .

We used 15 items from the extra-short form Big Five Inventory-2 (BFI-2-XS; Soto & John, 2017) at baseline (T1) to assess extraversion (three items,  $\alpha = .61$ ; e.g., “Is full of energy”), agreeableness (three items,  $\alpha = .34$ ; e.g., “Is compassionate, has a soft heart”), conscientiousness (three items,  $\alpha = .55$ ; e.g., “Is reliable, can always be counted on”), negative emotionality (three items,  $\alpha = .70$ ; e.g., “Worries a lot”), and open-mindedness (three items,  $\alpha = .52$ ; e.g., “Is original, comes up with new ideas”). Responses were given on 5-point rating scales (1 = *Strongly disagree* to 5 = *Strongly agree*). Items were mean

aggregated for each personality trait, with higher scores indicating more extraversion ( $M = 3.21$ ,  $SD = 0.91$ ), agreeableness ( $M = 3.89$ ,  $SD = 0.66$ ), conscientiousness ( $M = 3.39$ ,  $SD = 0.77$ ), negative emotionality ( $M = 3.23$ ,  $SD = 0.98$ ), and open-mindedness ( $M = 3.97$ ,  $SD = 0.74$ ).

A correlation analysis showed that participants high in extraversion had higher promotion focus scores,  $p < .001$ , similar to those high in conscientiousness,  $p = .009$ , and those high in open-mindedness,  $p < .001$ . In contrast, participants high in negative emotionality had lower promotion focus scores,  $p < .001$ , and perceived more threat at T2,  $p < .001$ .

Personality traits were neither associated with prevention scores, all  $p \geq .135$ , nor with sexual activity at T3, all  $p \geq .127$ . Based on these findings, we only ruled out the potential confound of negative emotionality in our findings. Results showed that the indirect effects through perceived threat became weaker for intercourse frequency,  $b = -0.01$ ,  $SE = .01$ , 95% CI [-0.031; 0.000], and oral sex frequency,  $b = -0.01$ ,  $SE = .01$ , 95% CI [-0.032; 0.000].